63D CONGRESS, 2d Session. } HOUSE OF REPRESENTATIVES. { DOCUMENT No. 1130.

STAMFORD HARBOR, CONN.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON PRELIMINARY EXAMINATION AND SURVEY OF STAMFORD HARBOR, CONN., WITH A VIEW TO SECURING INCREASED DEPTH AND REMOVAL OF OBSTRUCTIONS TO NAVIGATION.

JULY 21, 1914.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustrations.

WAR DEPARTMENT,
Washington, July 20, 1914.

THE SPEAKER OF THE HOUSE OF REPRESENTATIVES:

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated July 17, instant, together with copies of reports from Maj. G. B. Pillsbury, Corps of Engineers, dated May 21, 1913, April 8, 1914, and June 5, 1914, with map, upon a preliminary examination, survey, and supplemental report on servey, respectively, of Stamford Harbor, Conn., made by him in compliance with the provisions of the river and harbor act approved March 4, 1913.

Very respectfully,

HENRY BRECKINRIDGE,
Assistant Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, July 17, 1914.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of Stamford Harbor, Conn.

1. There are submitted herewith, for transmission to Congress, reports dated May 21, 1913, April 8, 1914, and June 5, 1914, with map, by Maj. G. B. Pillsbury, Corps of Engineers, on preliminary

examination, survey, and supplemental report on survey, respectively, of Stamford Harbor, Conn., with a view to securing increased depth and removal of obstructions to navigation, authorized by the river and harbor act approved March 4, 1913.

2. Stamford Harbor is on the north shore of Long Island Sound, about 21 miles southwest of Bridgeport Harbor. The existing project for its improvement provides for a channel in the West Branch 7 feet deep and 150 feet wide, with a basin of the same depth to the limits of the harbor lines at the head of the channel, a channel in the East Branch 9 feet deep and 100 feet wide except near the head, where for a distance of 1,150 feet the width varies from 80 to 125 feet. The district officer states that since the existing project was adopted, in 1892, the draft of vessels employed in the local commerce of Long Island Sound has considerably increased, and the depth of this waterway is no longer sufficient for the most convenient and economical delivery of freight. To meet the needs of commerce and navigation he recommends the following improvements:

East Branch, channel 12 feet deep and from 85 to 125 feet wide	$116,000
West Branch, channel and basin 9 feet deep and 150 feet wide, following proposed new alignment	52,000
Entrance channel, 12 feet deep and 200 feet wide	19,000
	187,000

The division engineer concurs in general with the views of the district officer, but favors a width of 200 feet through the basin at the upper end of the West Branch Channel, at an additional cost of $4,686.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated June 30, 1914. The board concurs with the district officer and the division engineer regarding the work proposed in the entrance channel and the East Branch, but it believes that it is advisable to provide in the West Branch a width of 100 feet in the channel and 200 feet in the basin, the total estimate of cost of the plan as thus modified being $183,000.

4. After due consideration of the above-mentioned reports, I concur with the views of the Board of Engineers for Rivers and Harbors, and therefore report that the further improvement by the United States of Stamford Harbor, Conn., is deemed advisable to the extent of providing an entrance channel 12 feet deep at mean low water and 200 feet wide, a channel in the East Branch 12 feet deep at mean low water and from 85 to 125 feet wide, and a channel in the West Branch 9 feet deep at mean low water and 100 feet wide, following the new alignment, with a basin at the head of the same depth and 200 feet wide, approximately as shown on the accompanying map, at a total estimated cost of $183,000 for first construction and $5,000 annually for maintenance; provided that no expense shall be incurred by the United States for acquiring any lands required for the purpose of this improvement. The full amount of the estimate should be provided in one appropriation.

DAN C. KINGMAN,
Chief of Engineers, United States Army.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
June 30, 1914.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. The following is in review of the district officer's reports on preliminary examination and survey of Stamford Harbor, Conn., with a view to securing increased depth and removal of obstructions to navigation, called for by the act of March 4, 1913.

2. The existing project for Stamford Harbor, adopted in 1892, as modified in 1901 and completed in 1911, provides for a channel in the West Branch 7 feet deep and 150 feet wide, with a turning basin of the same depth at the head of the channel, and for a channel in the East Branch 9 feet deep and from 80 to 125 feet wide. The mean rise of the tide is about 7.4 feet.

3. Stamford is a prosperous manufacturing town with a population of about 25,000. The commerce in recent years has ranged from about 165,000 to 217,000 tons in the East Branch and 67,000 to 95,000 tons in the West Branch, making a total of 260,000 to 300,000 tons, having a value of about $12,000,000 to $15,000,000.

4. Since the adoption of the present project the draft of vessels employed in the local commerce on Long Island Sound has increased considerably, and the depth now available is insufficient for the convenient and economical delivery of freight. The draft of the steamers regularly running to this harbor is about 8.5 feet, and as the tide falls below the mean level frequently from 1.5 feet to 3 feet, delays are experienced through lack of depth. Coal is the principal article of commerce, and the larger coal barges are unable to berth in the East Branch, and only comparatively small barges can be used in the West Branch. Those interested desire an increase in depth to 12 feet. This is practicable in the East Branch, but in the West Branch the channel is underlaid with rock, and the greatest depth that can be economically secured there is 9 feet.

5. The estimates submitted by the district officer in his original report of survey and in a supplemental report requested by the board are as follows for the various plans of improvement indicated on the maps:

East Branch, 12 feet deep and from 85 to 125 feet wide, with widening at bends	$116,000
West Branch, basin at head of channel about 1,475 feet long:	
A_1, 9 feet deep and 150 feet wide	14,762
A_2, 9 feet deep and 200 feet wide	19,440
A_3, 9 feet deep and 250 feet wide	23,485
West Branch Channel, exclusive of basin:	
B_1, 9 feet deep and 100 feet wide, following present alignment	19,333
B_2, 9 feet deep and 100 feet wide, following new alignment	28,222
9 feet deep and 150 feet wide, following present alignment	24,800
9 feet deep and 150 feet wide, following new alignment	36,821
Entrance channel, 12 feet deep and 200 feet wide	19,000

6. The plan of improvement proposed by the district officer provides for a channel 12 feet deep and from 85 to 125 feet wide in the East Branch, with a moderate widening at bends; a channel 9 feet

deep and 150 feet wide in the West Branch, including the basin, with some straightening of alignment and widening at the bends; and an entrance channel 12 feet deep and 200 feet wide, at a total estimated cost of $187,000 for first construction and $5,000 annually for maintenance. It is expected that a considerable reduction in freight rates would result from the improvement now contemplated. The district officer is of opinion that the locality is worthy of additional improvement to the extent outlined above. The division engineer concurs in general with the district officer, but recommends an increase of width in the West Branch Basin to 200 feet, at an additional cost of $4,686. He invites attention to the fact that Stamford Harbor is one of the places where it is evident that vessels navigating the New York State Canal will have to be accommodated, and this calls for a depth of 12 feet.

7. From the information now in hand it appears that the project depth, adopted more than 20 years ago, is insufficient to meet the present needs of navigation. The desired depth of 12 feet can be provided in the East Branch at a cost that seems reasonable when compared with probable resulting benefits, but underlying rock in the West Branch limits the improvement that is economically justifiable there at this time to a depth of 9 feet. After careful consideration of the different plans of improvement estimated for the West Branch, the board is of opinion that the most advantageous one, in view of the cost and the resulting benefits, is a channel 100 feet wide, following the new alignment, and a basin 200 feet wide. The entrance channel proposed by the district officer is recommended for approval. The board therefore reports that in its opinion it is advisable for the United States to provide an entrance channel 12 feet deep and 200 feet wide; a channel in the East Branch 12 feet deep and 100 feet wide, with increased width at the turns, to a point about 1,100 feet from the head of navigation, thence of the same depth and from 85 to 125 feet wide to the head of navigation; a channel in the West Branch 9 feet deep and 100 feet wide, following the new alignment, and a basin 200 feet wide at its head, approximately as shown on the accompanying map, at a total estimated cost of $183,000 for first construction and $5,000 annually for maintenance; provided that no expense shall be incurred by the United States for acquiring any lands required for the purpose of this improvement. The entire amount of the estimate should be made available in one appropriation.

8. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects so related to the project proposed that they may be coordinated therewith to lessen the cost and compensate the Government for expenditures made in the interests of navigation.

For the board:

W. M. Black,
Colonel, Corps of Engineers,
Senior Member of the Board.

PRELIMINARY EXAMINATION OF STAMFORD HARBOR, CONN.

UNITED STATES ENGINEER OFFICE,
New London, Conn., May 21, 1913.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Preliminary examination of Stamford Harbor, Conn.

1. The following report on the preliminary examination of Stamford Harbor, Conn., with a view to securing increased depth and the removal of obstructions to navigation, is submitted in compliance with the provisions of the river and harbor act approved March 4, 1913.

2. Stamford Harbor lies on the north shore of Long Island Sound, about 21 miles to the southwestward of Bridgeport Harbor. It consists of a bay about 2 miles wide across its mouth, extending inland nearly $1\frac{1}{2}$ miles, from the head of which two tidal inlets, known as the east and west branches, extend northerly into the city of Stamford. The west branch is the tidal portion of Mill River, a small stream dammed at the head of the channel, and the east branch was originally a small, crooked stream running through a salt marsh. The original depth in the west branch was from 1 to 3 feet at the head, gradually increasing in the bay to a depth of 12 feet. The original depth in the east branch was small, but this branch had been straightened and dredged to a depth of about $6\frac{1}{2}$ feet at mean low water, over a width of about 60 feet, by private enterprise before its improvement was begun by the Federal Government. In its improved state this branch was locally known as the "Canal."

3. The improvement of Stamford Harbor was begun by the Federal Government in 1886 under a project which provided for a channel 5 feet deep and 80 feet wide in the west branch only. This work was practically completed in 1892. The present project was adopted under authority of the act of July 13, 1892, in accordance with a report published in the Annual Report of the Chief of Engineers for 1891, page 849, covering the improvement of the west branch. The act provided in addition for the improvement of the east branch, and a project for the latter improvement was approved October 5, 1892. A modification to give increased width at the upper end of the east branch was approved February 12, 1901. The project as modified provides for a channel in the west branch 7 feet deep, 150 feet wide, and about $1\frac{1}{5}$ miles long, with a basin of the same depth to the limits of the harbor lines at the head of the channel; in the east branch, a channel 9 feet deep and 100 feet wide, except near the head, where, for a distance of 1,150 feet, the width varies from 80 to 125 feet. The entire project was completed in July, 1911.

4. The maximum draft which can be carried at mean low water in the head of the basin in the west branch is 6 feet, and to the east branch 8 feet. The approach to Stamford Harbor is through deep water in Long Island Sound. The mean rise of the tide is about 7.4 feet. No bridges cross the waterway.

5. References to reports of previous examinations and surveys are as follows:

Section covered.	Congressional documents.				Annual Reports of Chief of Engineers.	
	House or Senate.	Number.	Congress.	Session.	Year.	Page.
West Branch	Senate	50	Forty-eighth	First	1884	672
Do					1891	848

Both reports are without maps, but are the basis of projects adopted by Congress.

6. The city of Stamford is a prosperous and growing one, containing extensive manufacturing establishments and having a population in 1910 of 25,128. Two regular lines of steamers, landing in the East Branch, make daily trips to New York throughout the year, carrying freight and passengers, with additional service during the summer. The water-borne commerce for the calendar year 1911 aggregated 260,469 short tons, valued at $12,737,399.36. Of this, 95,593 tons valued at $397,709.84, were shipped to and from the West Branch, and 164,876 tons, valued at $12,339,689.52, were shipped to and from the East Branch. The commerce consists chiefly of coal, lumber, sand, stone, iron pipe, and steamboat freight. The reported tonnage and valuation of the commerce since 1890 is shown on the accompanying chart. The large amounts for 1896 are admittedly an overestimate. An examination of the chart shows that although the commerce fluctuates to a degree from year to year, it is on the whole, increasing. A future increase in the commerce is anticipated.

7. Since the existing project was adopted in 1892, the draft of vessels employed in the local commerce of Long Island Sound has considerably increased, and the depth of this waterway is no longer sufficient for the most convenient and economical delivery of freight. The draft of the steamers regularly running to the harbor is about 8½ feet, and no smaller boats could economically carry on the business. As the tide falls below its mean level under occasional extraordinary conditions as much as 3 feet and under ordinary conditions 1.5 feet, delays through lack of water are not unfrequent. I am informed by the agent of one of the lines that they occur as often as four or five times a month. The larger coal barges are unable to berth in the East Branch, and only comparatively small barges can be used in the traffic of the West Branch. Difficulty is also experienced in bringing in lumber schooners, and a portion of the load of the larger vessels must be lightered before these vessels can enter even the east channel. These conditions considerably increase the cost of water transportation.

8. The obstructions to navigation contemplated in the act are understood to be the rocks and ledges which lie near the east channel. These obstructions are particularly troublesome and dangerous at the bends in the channel. On account of the hazard to navigation which they create, certain lines are unwilling to enter the harbor. The removal of these obstructions would be incident to the widening of the channel at the bends.

9. The terminal facilities of the east branch consist of a nearly continuous line of wharves along both sides of the head of the channel; in the west branch the wharves inclose the basin at the head. These wharves are reasonably well provided with the ordinary unloading facilities. There are no publicly-owned wharves in the harbor, but the East Branch Dock Corporation has constructed on the easterly side of the east channel, near its head, a well-built wharf having about 700 feet frontage, about half of which is now used as a public wharf, and is open to all water carriers on equal terms. Several of the other private wharfs are open to public use, but the greater number are held for the exclusive use of their owners. It is understood that measures are being considered for the construction of a publicly-owned terminal in the west branch. A number of wharves have physical railroad connections. The terminal facilities are considered sufficient for the present commerce, and there is reasonable room for expansion to meet the demands of the expected growth in commerce of this port.

10. As Stamford Harbor is entirely tidal no question of water power development is connected with its improvement.

11. In view of its considerable commerce and the restriction that the present depths place upon water transportation, I am of the opinion that Stamford Harbor is worthy of further improvement to the extent of providing increased depth in both channels and removing obstructions to navigation by increasing the width of the east channel to the bends, provided that these improvements can be secured at a cost commensurate with the benefits that they will secure; and I recommend that a survey be authorized to determine the desirable extent and the cost of the improvement.

G. B. PILLSBURY,
Major, Corps of Engineers.

[First indorsement.]

OFFICE OF DIVISION ENGINEER, NORTHEAST DIVISION,
New York, May 23, 1913.

To the Chief of Engineers, concurring in the recommendations of the district engineer officer.

W. M. BLACK,
Colonel, Corps of Engineers.

[Third indorsement.]

THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
June 2, 1913.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. For reasons stated herein, the board concurs with the district officer and the division engineer in recommending a survey in order to determine the extent and advisability of the improvement.

For the board:

WM. T. ROSSELL,
Colonel, Corps of Engineers,
Senior Member of the Board.

SURVEY OF STAMFORD HARBOR, CONN.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
New London, Conn., April 8, 1914.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Survey of Stamford Harbor, Conn.

1. The following report on the survey of Stamford Harbor, Conn., with a view of securing increased depth and removal of obstructions to navigation, is submitted in compliance with departmental letter dated June 7, 1913, and pursuant to the requirements of section 3 of the river and harbor act of March 4, 1913.

2. A description of the harbor and of its previous improvement, and the grounds on which further improvement is desired, are set forth in detail in the report of the preliminary examination, submitted May 21, 1913, and need not be here repeated.

3. A survey of the harbor was made by the usual methods, and was supplemented by an extended series of probings to determine the character of the underlying material, and the limits of ledge rock. A map reduced from the detail sheets of the survey, together with these detail sheets, accompanies this report.

4. In the east branch of the harbor, those interested in its navigation desire that the channel depth be increased from 9 feet at mean low water, now secured under the existing project, to 12 feet; and a study of the transportation conditions shows that such increase in depth is highly desirable. It will afford uninterrupted navigation, except at extraordinary low stages of the tide, to the steamers which regularly ply between the harbor and New York, and which are now subjected to occasional vexatious delays on account of deficient channel depth. It will facilitate and cheapen the transportation of coal, which forms the largest item in the tonnage of the harbor. The barges in ordinary use for transporting coal from the terminals in New Jersey to the ports of Long Island Sound draw normally 12 feet, but the draft may be increased by irregularities in loading. Since the bottom in Stamford Harbor is hard and rocky, barges of this draft must now be taken in on the top of the tide, and then only with some risk of damage. On account of the difficulty and danger involved in taking in large barges, and the added cost of transportation in small barges, the water freights on coal to the east branch of Stamford Harbor are at least 7 cents per ton more than to the Cedar Creek branch of Bridgeport Harbor, although the haul to the latter port is some 21 miles farther. This discrepancy in cost would be largely removed by increasing the channel depth to 12 feet, which is that of the Cedar Creek Channel. The increase in depth would be of great benefit, also, in the transportation of lumber. The lumber now shipped to Stamford by water in the deeper draft schooners from southern ports must be transshipped into barges, as these vessels can not go up the channel even at the high tide. I am informed by a prominent lumber dealer in Stamford that the consequent lighterage cost is from $1.25 to $2 per thousand board feet, much of which would be saved could the larger vessels be brought to the wharves.

5. Of importance almost equal to the increase in depth is the removal of obstructions to navigation in the east branch by enlarging

the channel at the bends. The enlargement proposed at the two worst turns is shown on the map.[1] No more extensive enlargement is possible at a reasonable cost on account of the large amount of rock that would be encountered in its accomplishment.

6. In the west branch of the harbor those interested in its navigation desire that the present channel depth be increased from 7 feet at mean low water, now provided, to 12 feet, as proposed for the east branch. While such depth is nearly as desirable in the west as in the east branch, except as concerns the operation of the steamboat lines, the survey shows that it can not be secured without excessive cost on account of rock, which underlies the basin at the head of the channel at a depth of approximately 9 feet below mean low water. The economical limit of the development of this channel is consequently 9 feet. The west branch has not the commercial importance of its neighbor, its tonnage averaging, during the last 10 years, but 25 per cent of that of the east branch, and the justifiable cost of its improvement is consequently less. That an increase in depth to 9 feet will, however, be of great benefit, may be seen from the fact that, according to my best information, the water freight rate on coal to the west branch, with its present depth, is some 5 cents per ton higher than to the east branch, with present depth of 9 feet. It appears evident that, with the channel wider and, in general, straighter than in the east branch, the rates to the west branch will be materially reduced by increasing the depth to 9 feet.

7. It is believed extremely inadvisable to perpetuate the crooked alignment of the west branch channel when further improvement is made, as the bends add very considerably to the difficulty of navigation. Comparative estimates show that the cost of the straighter channel, shown on the map, of the proposed depth of 9 feet is about $12,000 more than the cost of deepening the channel, but retaining its present alignment. The portions of the present channel lying outside of the new channel lines would serve a most useful purpose in affording small anchorage areas for minor craft, which are now moored along the sides of the channel, the remainder of the harbor being nearly bare at low tide, and are very much in the way. This rectification of the alignment is believed to be well worth its cost. It is not believed appropriate, on the other hand, for the United States to provide the increased depth throughout the entire area of the anchorage basin at the head of the channel, and the plan recommended proposes the excavation of a channel through its middle portion only, as shown on the map. The material underlying the basin is glacial drift containing numerous bowlders. Estimates show that the cost of extending the excavation over the entire basin would be $29,000 in excess of that of the improvement proposed. This excavation would be of no material benefit except in front of the wharves which accommodate the larger vessels; but the United States could not well discriminate between the different riparian owners. It is, besides, believed but equitable that the cost of securing access from the main channel to the individual wharves should be borne by those for whose sole benefit the necessary excavation is made.

8. The present channel widths of 100 feet in the East Branch and 150 feet in the West Branch have been retained. While the channel having the least commerce has thus the greater width, it may be

[1] Not printed.

pointed out that, aside from the question whether a consideration of an extensive change in width was contemplated under the terms of the authorization for the survey, the cost of increasing the width of the East Branch channel to 150 feet would be out of proportion to the resulting benefit to commerce, on account of the large quantities of rock that would have to be removed. The saving, on the contrary, that would be effected by reducing the width of the West Branch channel would be comparatively small, and would not compensate for the disadvantages resulting from the narrow channel.

9. To secure the full advantage of the improvements proposed in the branch channels it is necessary that the entrance channel be given sufficient width to permit easy navigation, and a width of 200 feet has accordingly been adopted in the plans and estimates. The depth of the approach channel must necessarily be that of the deeper of the branches, or 12 feet at mean low water.

10. The estimated cost of the proposed improvements is as follows:

EAST BRANCH.

Dredging:		
266,000 cubic yards mud, sand, and gravel, at 26 cents	$69,160	
1,337 cubic yards bowlders, at $10	13,370	
1,240 cubic yards ledge rock, at $15 (to 13-foot depth)	18,600	
540 cubic yards, overdepth allowance, ledge, at $7.50	4,050	
Administration and inspection	10,820	
		$116,000

WEST BRANCH.

Dredging:		
162,000 cubic yards mud, sand, and gravel, at 23 cents	37,260	
1,000 cubic yards bowlders, at $10	10,000	
Administration and inspection	4,740	
		52,000

ENTRANCE CHANNEL.

Dredging 96,000 cubic yards mud, at 18 cents	17,280	
Administration and inspection	1,720	
		19,000
Total		187,000

The cost of maintenance should not greatly exceed the cost of maintaining the existing channels. It is estimated at $5,000 per year.

11. The commercial statistics of the harbor are briefly set forth in the report on the preliminary examination. Since the date of that report the statistics for the year 1912 have been received and tabulated. Detailed statistics for the years 1908 to 1912 are as follows:

EAST BRANCH.

Article.	1908	1909	1910	1911	1912	Average.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Coal	65,300	82,154	87,667	73,727	78,267	77,423
Lumber and piles	7,181	10,542	8,935	9,710	9,423	9,158
Sand	9,398	10,586	17,899	10,287	11,401	11,914
Stone	5,814	8,120	5,769	7,207	7,586	6,899
Iron and iron pipe	668	1,690	1,569	2,443	1,600	1,594
Submarine cable	.....	.....	.....	.....	9,780	1,956
Steamboat freight	201,600	95,543	71,232	60,000	103,989	106,473
Miscellaneous	437	1,532	2,935	1,502	1,888	1,659
Total	290,398	210,167	196,006	164,876	223,934	217,076
Received	228,462	181,727	176,979	144,451	179,998	182,323
Shipped	61,936	28,440	19,027	20,425	43,936	34,753
Valuation	$10,104,350	(1)	$15,741,692	$12,339,690	$14,530,667	$13,179,100

WEST BRANCH.

Article.	1908	1909	1910	1911	1912	Average.
	Short tons.	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*	*Short tons.*
Coal	31,856	34,098	35,732	28,739	37,506	33,586
Sand	3,248	2,440	250	950	7,102	2,798
Stone	168	.....	1,500	51,065	9,000	12,347
Iron and pipe	3,405	3,256	2,180	530	1,740	2,222
Earths and ores	14,207	12,364	13,020	10,828	18,571	13,798
Petroleum products	.....	.....	2,722	3,143	4,139	2,001
Miscellaneous	528	2,290	100	338	280	707
Total	53,412	54,448	55,504	95,593	78,338	67,459
Received	49,258	50,888	50,766	90,359	74,343	63,123
Shipped	4,154	3,560	4,738	5,234	3,995	4,336
Valuation	$335,490	(1)	$388,545	$397,710	$425,144	$386,722

[1] Not separately reported.

TOTAL FOR HARBOR.

Tonnage (short tons)	343,810	264,615	251,510	260,469	302,272	284,533
Valuation	$10,439,840	$10,522,311	$16,130,236	$12,737,399	$14,955,811	$12,957,119

12. Stamford lies on the main line of the New York, New Haven & Hartford Railroad Co. and is the terminus of a branch line running to New Canaan, Conn. It is a manufacturing center of considerable and growing importance. As it is but 35 miles, by water, from New York City, and as many of its factories are adjacent to the channels, water transportation is an important factor in its commercial prosperity.

13. In view of the very considerable advantage to commerce, and decrease in the cost of transportation consequent to its execution, I am of the opinion that the further improvement of Stamford Harbor, Conn., securing increased depth and removing obstructions to navigation by straightening the channels and widening their turns is justified to the extent of providing:

An entrance channel 12 feet deep and 200 feet wide.

A channel in the east branch 12 feet deep and 100 feet wide, with increased width at the turns, to a point about 1,100 feet from the head of navigation, thence of the same depth and from 85 to 125 feet wide to the head of navigation.

A channel in the west branch 9 feet deep and 150 feet wide to a point 150 feet from the harbor line at its head.

The estimated cost of the necessary work is $187,000 for first construction and $5,000 per annum for maintenance.

14. The proposed channel in the east branch is considered suitable at all usual tides for boats of a maximum draft of 9 feet; at mean low water, for those of a maximum draft of $10\frac{1}{2}$ feet; and at mean high water, for those of a maximum draft of 17 feet; the proposed channel in the west branch is considered suitable at mean low water for boats having a maximum draft of $7\frac{1}{2}$ feet, and at mean high water for boats having a maximum draft of 14 feet, for which these channels are respectively designed.

15. Should the project be adopted by Congress, the work should be prosecuted under one contract at a rate sufficient to secure its completion in two years, and the entire amount should consequently be appropriated in one sum.

G. B. Pillsbury,
Major, Corps of Engineers.

[First indorsement.]

THE DIVISION ENGINEER, NORTHEAST DIVISION,
New York City, April 14, 1914.

To the Chief of Engineers, United States Army.

1. Forwarded. I concur in general with the district officer.

2. The plans are well considered, and the estimates are believed to be conservative and safe. In the widening near Lower White Rock the proposed channel encroaches somewhat on land lying above the mean low water contour. In Connecticut titles run to high water or low water according to the wording of the individual deeds. It will be well, therefore, to make this widening conditional by law upon the donation free of cost to the United States of any land which may be privately owned between high and low water lines.

3. It is well to call attention to the fact that Stamford Harbor is one of the places where it is evident that vessels navigating the New York State barge canal will have to be accommodated. This of itself calls for the depth of 12 feet in the entrance channel and in at least one of the inner channels. The choice of the eastern channel for this deeper draft is, in my opinion, well considered, as this is the one most likely to be used by such craft.

FREDERIC V. ABBOT,
Colonel, Corps of Engineers.

[For report of the Board of Engineers for Rivers and Harbors on survey see page 3.]

SUPPLEMENTAL REPORT ON STAMFORD HARBOR, CONN.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
New London, Conn., June 5, 1914.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army
(Through the Division Engineer).
Subject: Supplementary report on Stamford Harbor, Conn.

1. The following additional estimates are submitted covering the alternative plans for the improvement of the west branch of Stamford Harbor, detailed in the letter from the Board of Engineers for Rivers and Harbors, dated May 5, 1914, with reference to the report on the survey of the harbor submitted by this office April 8, 1914.

2. Estimates (a) for the channel in the basin at the head of the west branch, covering a length of about 1,475 feet, 9 feet in depth:

	150 feet wide, as recommended by the district officer.	200 feet wide.	250 feet wide.
Dredging, cubic yards (mud, sand, and gravel)	32,400	42,600	51,500
Bowlders, cubic yards	370	490	590
Cost, including administration and inspection	$14,762	$19,448	$23,485

3. Estimates (b) for the channel in the west branch, not including the basin, 9 feet deep, and of widths stated, suitably enlarged at the bends:

	100 feet wide, following course of present channel.	100 feet wide on new alignment proposed by the district officer.	150 feet wide, as in original report.
Dredging, cubic yards (mud)	67,500	98,600	129,400
Bowlders, cubic yards	340	495	630
Cost, including administration and inspection	$19,333	$28,222	$36,821

4. It was believed desirable to seek the views of those interested in the navigation of the harbor before reporting upon the alternative plans covered by these estimates, and a conference was had with the Stamford Harbor Improvement Association on May 28. A strong desire was expressed by the members of the association that the channel leading to the basin follow the straighter alignment proposed in the original report, as the upper bend in the present channel presents marked difficulties to navigation. The widening of the channel in the basin, as contemplated in the alternative estimates, was regarded as very desirable, with the view that it would facilitate the maneuvering of vessels to their berths at the wharves, even if it were secured at the expense of a narrower channel leading to the basin. It was the consensus of opinion that a channel 100 feet wide to the basin, following the straighter alignment proposed in the original report, and 200 feet wide within the basin, would satisfactorily serve present needs.

5. The width of 150 feet in the channel leading to the basin was recommended in the original report largely with the view that ample width is desirable from the standpoint of maintenance. The channel will inevitably shoal progressively from the sides toward the middle, but a channel 150 feet wide will afford a navigable width of 100 feet of full depth for a considerable number of years. When redredging becomes necessary the volume of material and the depth of cutting along the banks will be sufficient to command favorable prices from dredging contractors. If the channel is first cut to the strictly necessary width only, redredging must be done at more frequent intervals, and at a higher unit cost. The channel in the basin, on the contrary, has no high banks along its edges, the whole basin having already been dredged to a depth of 7 feet, and it may therefore be expected that this channel will shoal but slowly and that the full width will be continuously available. As the usual barges are less than 150 feet in length, it was believed that 150 feet would afford sufficient space for maneuvering the loaded barges. The light barges have the whole basin at their command. The width of 200 feet, desired by local interests, would, however, obviously afford greater convenience to navigation of the deeply loaded vessels.

6. It is my view, therefore, that a width of 150 feet in the channel in the west branch leading to the basin is desirable, although a width of 100 feet will serve present needs. If a width of 100 feet is chosen, it should follow the straighter alignment proposed in the original

report. A width of 150 feet in the basin will, I believe, serve the necessities of commerce, but a channel 200 feet wide in this section will offer greater convenience to navigation.

G. B. PILLSBURY,
Major, Corps of Engineers.

[Third indorsement.]

THE DIVISION ENGINEER, NORTHEAST DIVISION,
New York City, June 12, 1914.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. Forwarded, with the additional estimates and information desired by the Board of Engineers for Rivers and Harbors.

2. For the reasons stated in paragraph 5 of the supplementary report I believe the 150-foot channel is worth the $8,599 difference in initial cost when compared with the 100-foot channel on the new alignment proposed by the district engineer officer. I do not recommend the 100-foot channel following the present crooked trace. I believe the 200-foot basin sufficiently better than the 150-foot basin originally proposed to justify the increase of $4,686 involved in its creation, as this is not very large when compared with the cost of the improvements of the west channel as a whole.

FREDERIC V. ABBOT,
Colonel, Corps of Engineers.

1913

STAMFORD HARBOR

CONNECTICUT

SURVEYED UNDER DIRECTION OF
MAJOR G. R. PILLSBURY, CORPS OF ENGINEERS, U. S. ARMY,
BY G. E. VERRILL, ASST ENGR. AND
L. W. PINES, JUN ENGR

SCALE, 1 - 9600

100' 0 500 1000 1500 2000 FT

THE MEAN RANGE OF TIDE IS 7.3 FEET
MEAN LOW WATER IS SHOWN THUS
THE 3 FOOT CONTOUR
6 " " " "
9 " " " "
12 " " " "
15 " " " "
18 " " " "
21 " " " "

SOUNDINGS ARE EXPRESSED IN FEET AND TENTHS AND REFER TO DEPTHS AT MEAN LOW WATER.

B. M. NO. 2 WEST BRANCH ON LOWER WHITE ROCK. THIS B. M. IS HARBOR LINE "STATION A" AND CONSISTS OF A DEPRESSED SQUARE, WITH DRILL HOLE IN CENTER, CUT ON THE SOUTHERLY SIDE OF THE ROCK. ELEVATION ABOVE MEAN LOW WATER 9.378

TOPOGRAPHY AND HYDROGRAPHY MAINLY TAKEN DURING OCTOBER AND NOVEMBER, 1913, BUT TOPOGRAPHY BROUGHT UP TO MARCH 1, 1914.

CHANNEL LINES, PROJECT OF 1912, SHOWN THUS
" " PROPOSED BY DISTRICT OFFICER SHOWN THUS
" " ALTERNATE LAYOUT " "

ENGINEER OFFICE, U. S. ARMY
NEW LONDON, CONN.
JUNE 5, 1914.

TO ACCOMPANY REPORT ON SURVEY OF STAMFORD HARBOR, CONNECTICUT, MADE IN COMPLIANCE WITH ACT OF CONGRESS APPROVED MARCH 4 1913

MAJOR CORPS OF ENGINEERS.